

# Video signal switcher

## BA7604N

The BA7604N is a switching IC developed for use in VCRs. It has two-channel analog multiplexers, and features wide dynamic range, and wide operating frequency range, and is suitable for switching audio and video signals.

### ●Applications

VCRs and TVs

### ●Features

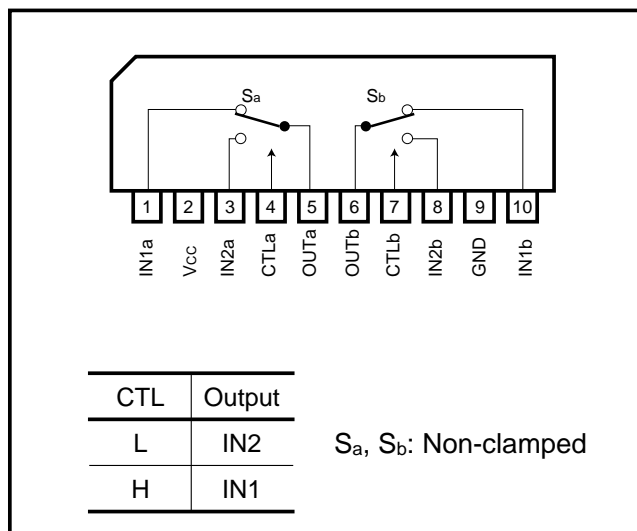
- 1) Two 2-input / 1-output switches.
- 2) 5V power supply.
- 3) Low power consumption (42mW Typ.).
- 4) Excellent frequency characteristics (10MHz, 0dB, Typ.).
- 5) Wide dynamic range (3.0V<sub>P-P</sub> Typ.).
- 6) High input impedance (20kΩ Typ.).
- 7) Fast switching speed (50ns Typ.).

### ●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>CC</sub>	9	V
Power dissipation	P <sub>d</sub>	500*	mW
Operating temperature	T <sub>opr</sub>	– 40 ~ + 85	°C
Storage temperature	T <sub>stg</sub>	– 55 ~ + 125	°C

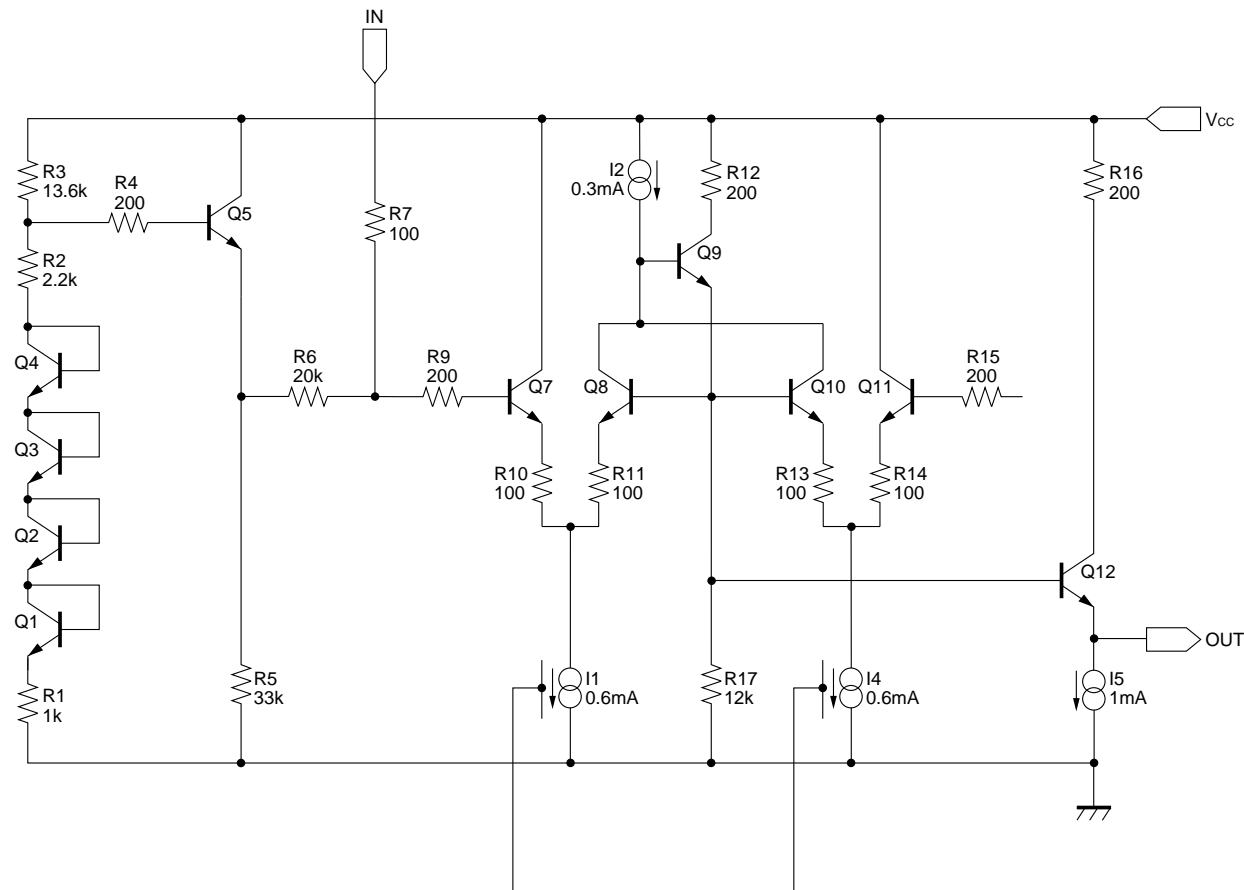
\* Reduced by 5.0mW for each increase in Ta of 1°C over 25°C.

### ●Block diagram

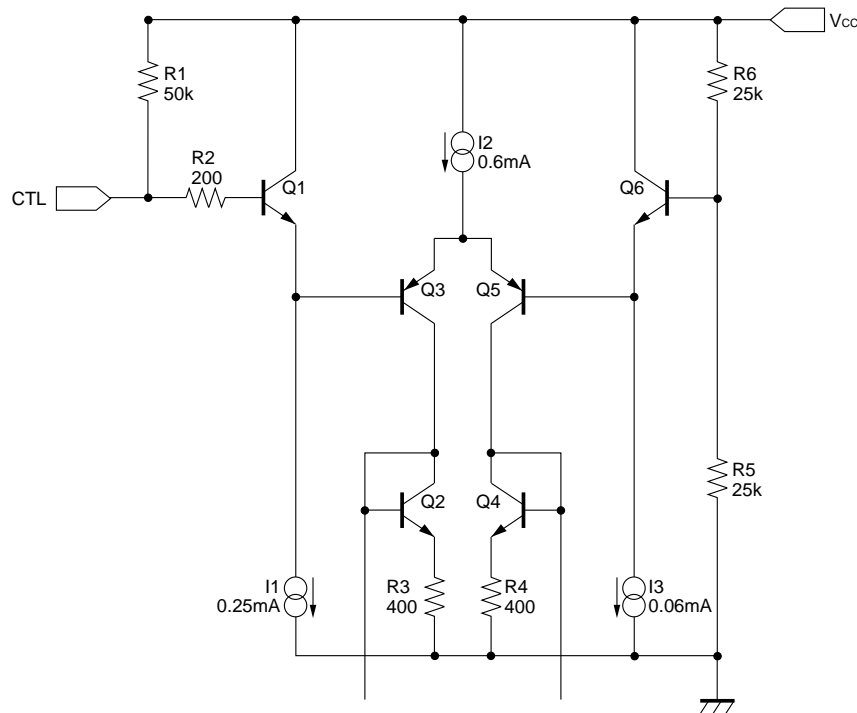


●Equivalent circuits

Sa, Sb



CTL



●Electrical characteristics (unless otherwise noted, Ta = 25°C and V<sub>CC</sub> = 5.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating voltage	V <sub>CC</sub>	4.5	5.0	5.5	V	—
Supply current	I <sub>CC</sub>	—	8.4	13.0	mA	—
Maximum output level	V <sub>om</sub>	2.7	3.0	—	V <sub>P-P</sub>	f = 1kHz, THD = 0.5%
Voltage gain	G <sub>V</sub>	− 0.5	0	0.5	dB	f = 1MHz, V <sub>IN</sub> = 1V <sub>P-P</sub>
Interchannel crosstalk	C <sub>T</sub>	—	− 65	—	dB	f = 4.43MHz, V <sub>IN</sub> = 1V <sub>P-P</sub>
Frequency characteristic	G <sub>f</sub>	− 3	0	1	dB	10MHz / 1MHz, V <sub>IN</sub> = 1V <sub>P-P</sub>
Total-harmonic distortion	THD	—	0.007	—	%	f = 1MHz, V <sub>IN</sub> = 1V <sub>P-P</sub>
CTL pin switch level	V <sub>TH</sub>	2.0	2.5	3.0	V	—
Input impedance	Z <sub>IN</sub>	14	20	26	kΩ	—

Note: Refer to the measurement circuit given in Fig. 1.

●Reference data

Pin DC voltages (reference values)

Units: V<sub>dc</sub>

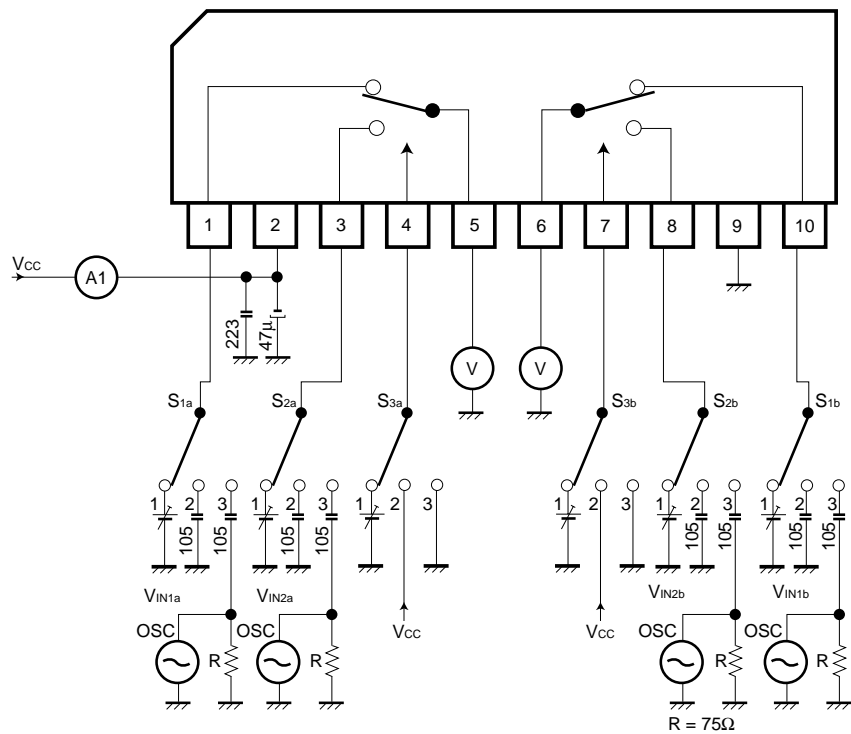
Pin No.	DC voltage	Pin No.	DC voltage
1	2.48	6	1.76
2	5.00	7	4.91
3	2.48	8	2.48
4	4.91	9	0
5	1.76	10	2.48

Electrical characteristics

Parameter	Min.	Typ.	Max.	Unit
Input impedance (no clamp)	—	20k	—	Ω
Output impedance	—	30	—	Ω

The input coupling capacitor values should be 0.1μF to 1μF.

●Measurement circuit



## ●Measurement conditions

Parameter		Symbol	Switch settings						Measurement method
			S <sub>1a</sub>	S <sub>2a</sub>	S <sub>3a</sub>	S <sub>1b</sub>	S <sub>2b</sub>	S <sub>3b</sub>	
Current dissipation		I <sub>CC</sub>	2	2	2	2	2	2	Ammeter
Maximum output level	IN1a	V <sub>om</sub>	3	2	2	2	2	2	Note 1
	IN2a	V <sub>om</sub>	2	3	3	2	2	2	
	IN1b	V <sub>om</sub>	2	2	2	3	2	2	
	IN2b	V <sub>om</sub>	2	2	2	2	3	3	
Voltage gain	IN1a	G <sub>V</sub>	3	2	2	2	2	2	Note 2
	IN2a	G <sub>V</sub>	2	3	3	2	2	2	
	IN1b	G <sub>V</sub>	2	2	2	3	2	2	
	IN2b	G <sub>V</sub>	2	2	2	2	3	3	
Interchannel crosstalk	IN1a	C <sub>T</sub>	2	3	2	2	2	2	Note 3
	IN2a	C <sub>T</sub>	3	2	3	2	2	2	
	IN1b	C <sub>T</sub>	2	2	2	2	3	2	
	IN2b	C <sub>T</sub>	2	2	2	3	2	3	
Frequency characteristic	IN1a	G <sub>f</sub>	3	2	2	2	2	2	Note 4
	IN2a	G <sub>f</sub>	2	3	3	2	2	2	
	IN1b	G <sub>f</sub>	2	2	2	3	2	2	
	IN2b	G <sub>f</sub>	2	2	2	2	3	3	
CTL pin switching level	CTLa	V <sub>TH</sub>	3	2	1	2	2	2	Note 5
	CTLb	V <sub>TH</sub>	2	2	2	3	2	1	
Total-harmonic distortion	IN1a	THD	3	2	2	2	2	2	Note 6
	IN2a	THD	2	3	3	2	2	2	
	IN1b	THD	2	2	2	3	2	2	
	IN2b	THD	2	2	2	2	3	3	
Input impedance	IN1a	Z <sub>IN</sub>	1	2	2	2	2	2	Note 7
	IN2a	Z <sub>IN</sub>	2	1	3	2	2	2	
	IN1b	Z <sub>IN</sub>	2	2	2	1	2	2	
	IN2b	Z <sub>IN</sub>	2	2	2	2	1	3	

Note 1: Connect a distortion meter to the output, and input a  $f = 1\text{kHz}$  sine wave. Adjust the output level until the output distortion is 0.5%. This output voltage at this time is the maximum output level  $V_{om}$  ( $V_{P-P}$ ).

Note 2: Input a  $1V_{P-P}$ ,  $1\text{MHz}$  sine wave. The voltage gain is given by  $G_V = 20 \log (V_{OUT} / V_{IN})$ .

Note 3: Input a  $1V_{P-P}$ ,  $4.43\text{MHz}$  sine wave. The interchannel crosstalk is given by  $C_T = 20 \log (V_{OUT} / V_{IN})$ .

Note 4: Input  $1V_{P-P}$ ,  $1\text{MHz}$  and  $10\text{MHz}$  sine waves. The frequency characteristic is given by  $G_f = 20 \log (V_{OUT} (f = 10\text{MHz}) / V_{OUT} (f = 1\text{MHz}))$ .

Note 5: Input a  $1V_{P-P}$ ,  $1\text{MHz}$  sine wave. Reduce the CTL pin voltage from  $V_{CC}$ . The CTL pin switching level ( $V_{TH}$ ) is the CTL pin voltage at which the  $V_{OUT}$  level drops below  $20mV_{P-P}$ .

Note 6: Input a  $1V_{P-P}$ ,  $1\text{kHz}$  sine wave and measure the total-harmonic distortion of the output using a total-harmonic distortion meter.

Note 7: Measure the input pin voltage  $V_{IN50}$  when a current of  $DC50\mu A$  is flowing into the input pin. Measure the input pin open-circuit voltage. The input impedance is given by  $Z = (V_{IN50} - V_{IN0}) / 50 \times 10^{-6}[\Omega]$ .

●External dimensions (Units: mm)

